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Hakan Plastik Piping Systems
Mr. Ali Karadeniz
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Your Ref.	Your message of	Our Ref.	Stuttgart,
		Mo/Wb	October 30, 2009

Test results, waste water noise, EN 14366

Dear Mr. Karadeniz,

enclosed you will receive the test results of August 18 and 19, 2009. Detailed information about test set up, test object and measurement procedure you will find in the test reports P-BA 186/2009e and 187/2009e.

Best regards
Fraunhofer-Institute of Building Physics

Responsible Test Engineer:

Dipl.-Ing. (FH) Joachim Mohr

Head of Laboratory:

Dr. rer. nat. L. Weber

FRAUNHOFER GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG e.V. 1
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amtlich anerkannte Prüfstelle

Annex: Table 1 and 2

Table 1 Hakan, measurements of August 18, 2009. Sound pressure levels measured in the installation test facility. Test object was the wastewater system "HAKAN SiLENTA Premium Highly Noise-Insulated" (manufacturer Hakan). The wastewater system consisted of straight plastic pipes and fittings, nominal width OD 110 and pipe clamps "Bismat 1000 SX100 SL125" (manufacturer BIS Walraven).

	Wastewater system "HAKAN SiLENTA Premium Highly Noise-Insulated" with pipe clamps "Bismat 1000 SX100 SL125"			
Flow rate [l/s]	0,5	1,0	2,0	4,0
Installation sound level L_{In} [dB(A)] measured in the basement test-room UG front [1])	43	45	48	50
Installation sound level L_{In} [dB(A)] measured in the basement test-room UG rear [1])	6	9	9	15
Airborne sound pressure level $L_{a,A}$ [dB(A)] [2])	43	45	48	50
Structure-born sound characteristic level $L_{sc,A}$ [dB(A)] [2])	4	7	7	13

[1]) Evaluation according to DIN 4109.

[2]) Evaluation according to DIN EN 14366.

Table 2 Hakan, measurements of August 19, 2009. Sound pressure levels measured in the installation test facility. Test object was the wastewater system "HAKAN SiLENTA 3A Noise Insulated DIN4102" (manufacturer Hakan). The wastewater system consisted of straight plastic pipes and fittings, nominal width OD 110 and pipe clamps "Bismat 1000 SX100 SL125" (manufacturer BIS Walraven).

	Wastewater system "HAKAN SiLENTA 3A Noise Insulated DIN4102" with pipe clamps "Bismat 1000 SX100 SL125"			
Flow rate [l/s]	0,5	1,0	2,0	4,0
Installation sound level L_{In} [dB(A)] measured in the basement test-room UG front [1])	46	48	49	52
Installation sound level L_{In} [dB(A)] measured in the basement test-room UG rear [1])	9	10	12	19
Airborne sound pressure level $L_{a,A}$ [dB(A)] [2])	46	48	49	52
Structure-born sound characteristic level $L_{sc,A}$ [dB(A)] [2])	7	8	9	16

[1]) Evaluation according to DIN 4109.

[2]) Evaluation according to DIN EN 14366.

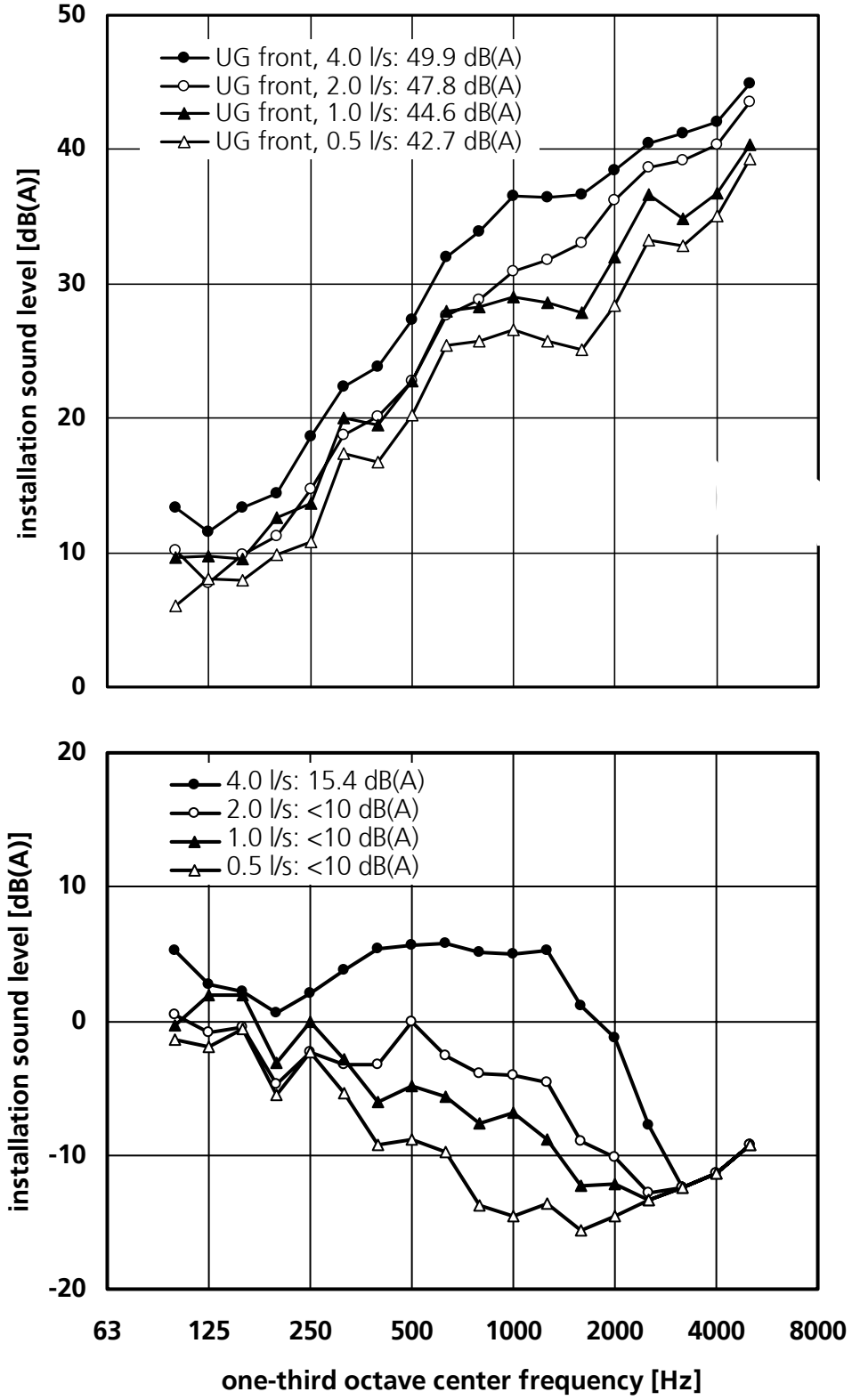

Figure 1 Wastewater pipe system "HAKAN SiLENTA Premium Highly Noise-Insulated Pipes (OD 110)" (manufacturer: HAKAN) mounted in sub-basement (KG), basement (UG front), ground floor (EG front) and top floor (DG) using pipe clamps "Bismat 1000 (SX100/SL125)" made by Walraven. The installation sound level L_{In} was measured at various flow rates in the test rooms UG front (above) and UG rear (below).

The tests were performed in a laboratory accredited by the German Accreditation System for Testing (DAP, file no. PL-3743.26) according to standard EN ISO/IEC 17025.

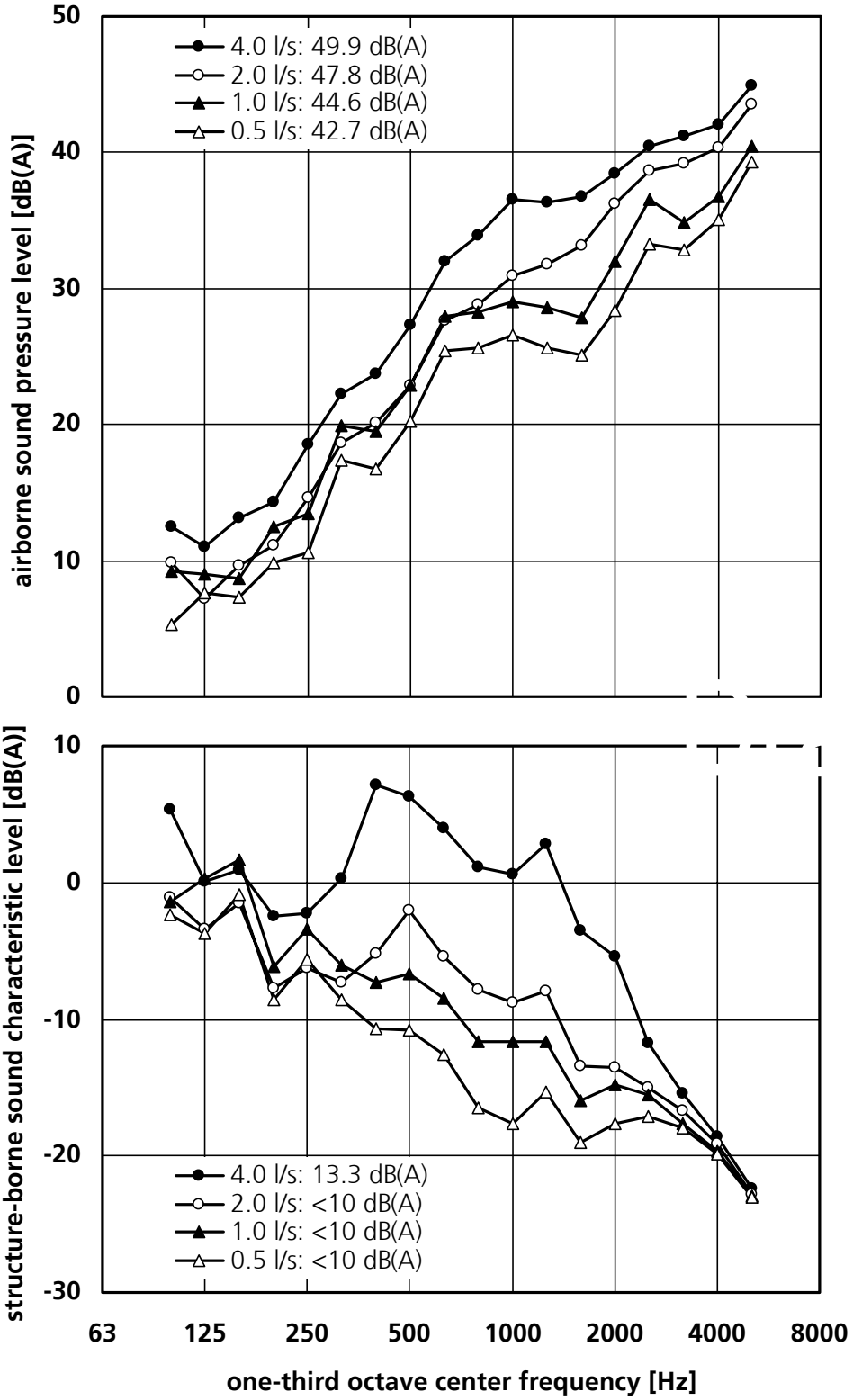

Figure 2 Wastewater pipe system "HAKAN SiLENTA Premium Highly Noise-Insulated Pipes (OD 110)" (manufacturer: HAKAN) mounted in sub-basement (KG), basement (UG front), ground floor (EG front) and top floor (DG) using pipe clamps "Bismat 1000 (SX100/SL125)" made by Walraven. Airborne sound pressure level (above) and structure-born sound characteristic level (below) measured at various flow rates according to DIN EN 14366.

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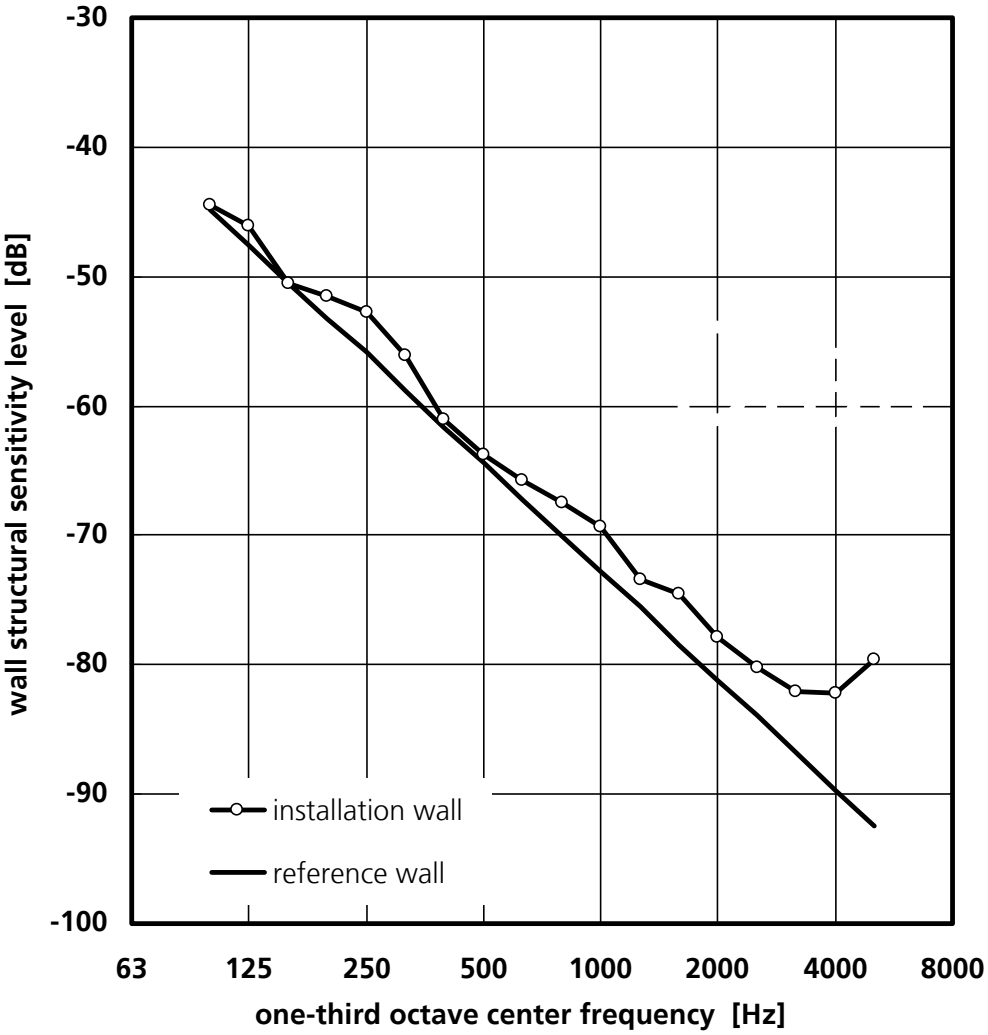

Figure 3 Wall structural sensitivity level L_{SS} of the installation wall between the test rooms UG front and UG rear in the installation test facility in the Fraunhofer-Institute of Building Physics. The installation wall consists of lime stones (thickness 115 mm, ceiled on both sides) with a mass per unit area of 220 kg/m². The indicated structural sensitivity level L_{SS} refers to the mounting position of the waste water system according to figure 4. For comparison the wall structural sensitivity level L_{SSR} of the reference wall is also indicated (evaluation according to DIN EN 14366).

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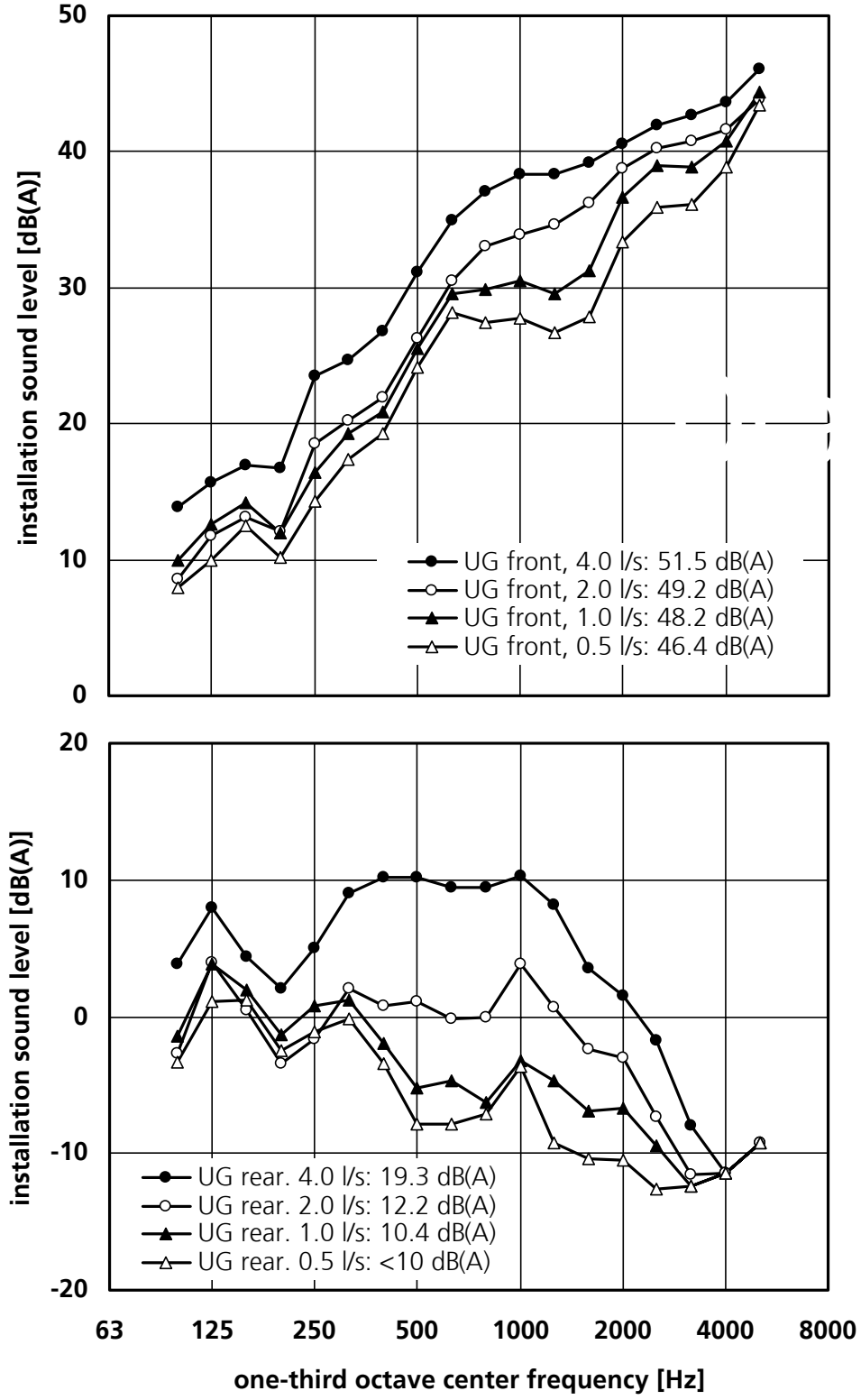

Figure 1 Wastewater pipe system "HAKAN 3A Low Noise Pipe (OD 110)" (manufacturer: HAKAN) mounted in sub-basement (KG), basement (UG front), ground floor (EG front) and top floor (DG) using pipe clamps "Bismat 1000 (SX100/SL125)" made by Walraven. The installation sound level L_{In} was measured at various flow rates in the test rooms UG front (above) and UG rear (below).

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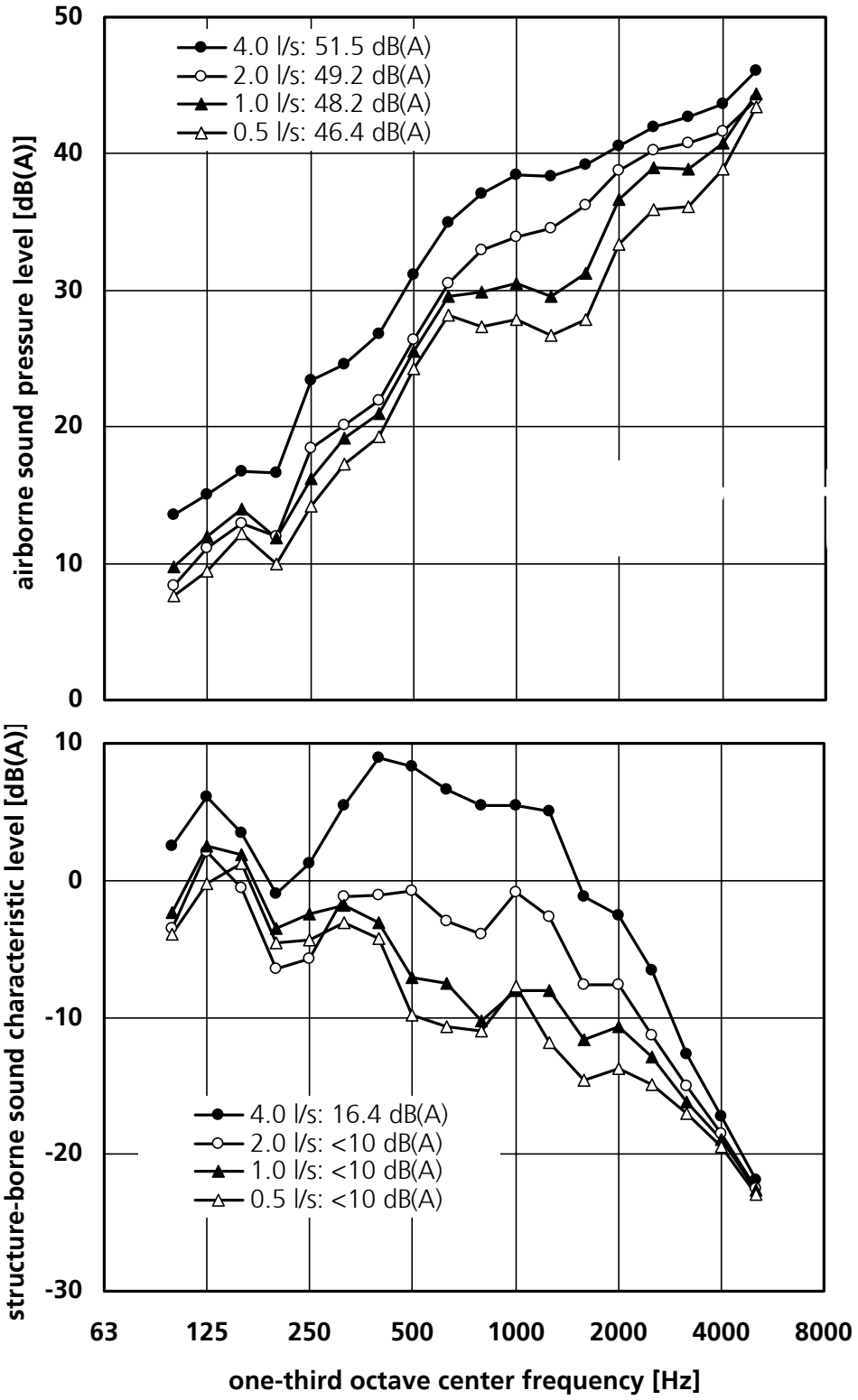

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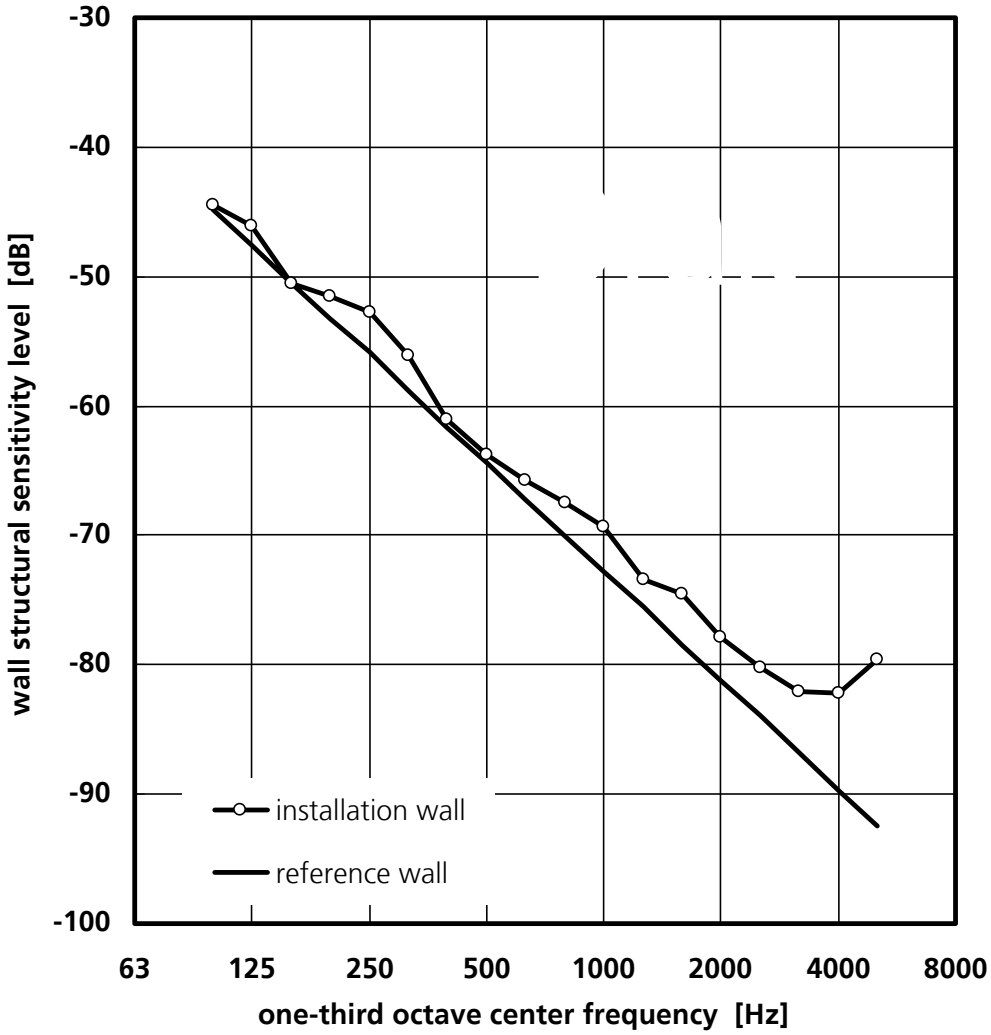

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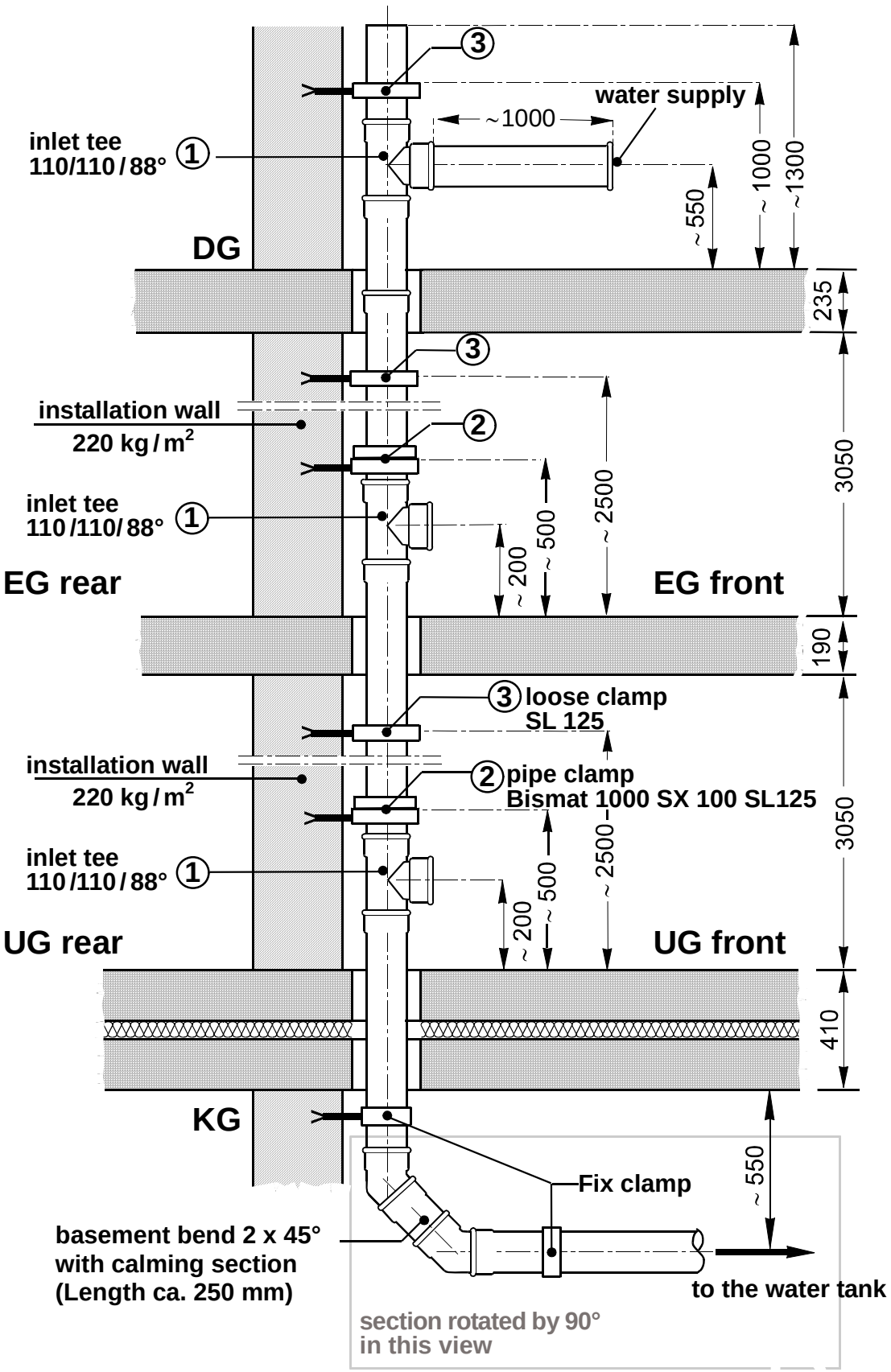
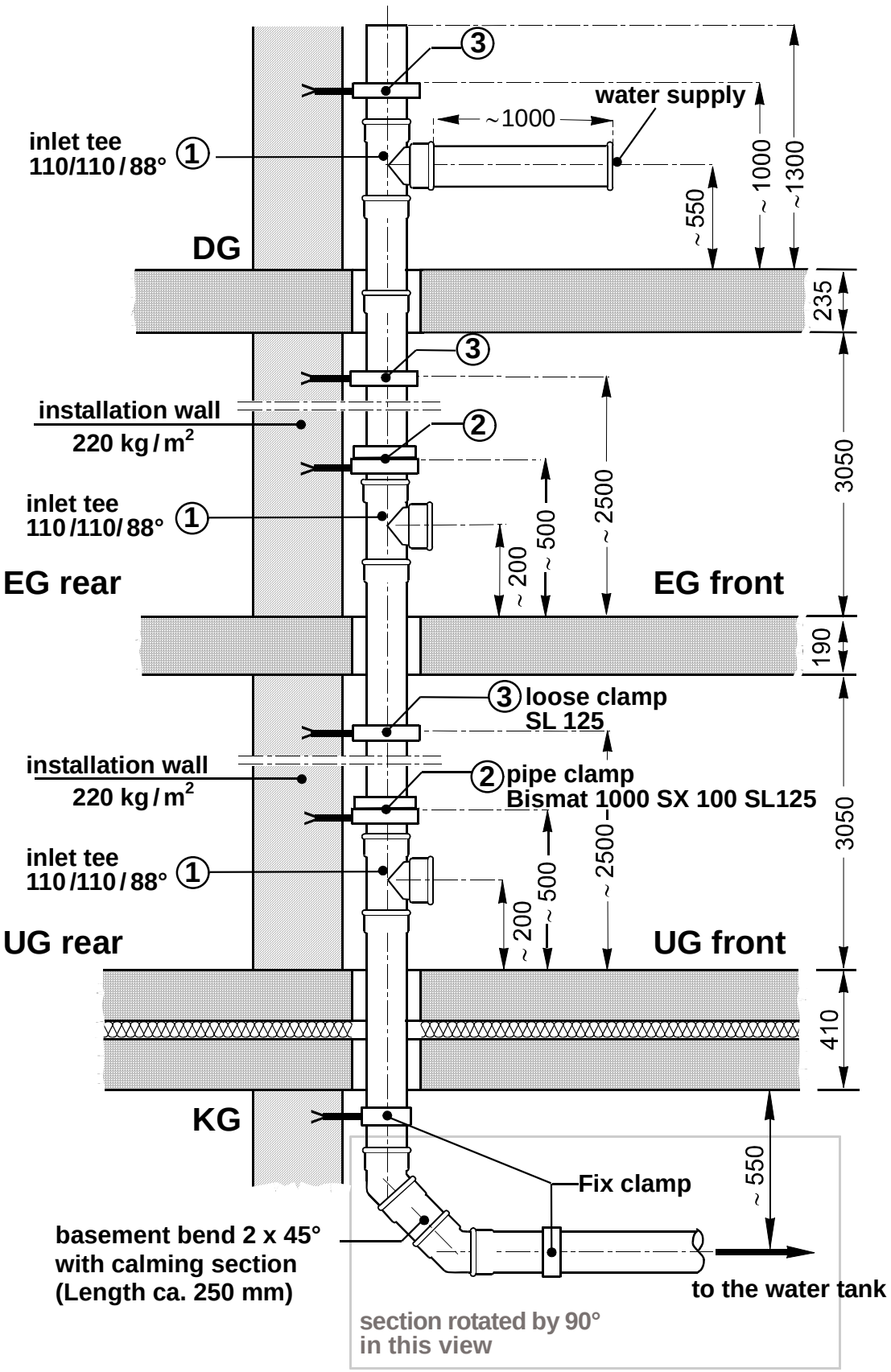


Figure 4 Installation plan of the pipe system "HAKAN SiLENTA Premium Highly Noise-Insulated Pipes (OD 110)" (manufacturer: HAKAN), mounted with clamps "Bismat 1000 (SX100/SL125)" (drawing not to scale, dimensions in mm).



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